

CLAIMS

1. A method for purging a system that is used in administrating therapeutic gas to a patient comprising:

A) providing a system that is adapted to administer therapeutic gas to a patient, the system including

(1) a front end which has a first solenoid purge valve and reservoir solenoid valve, first and second equalization valves, a first fluid conduit, a manifold, a front end pressure sensor, and

(2) a reservoir portion which has a reservoir unit, a fluid manifold, and a reservoir pressure sensor;

B) purging the front end; and

C) purging the reservoir portion.

2. A method for purging a system that is used in administrating therapeutic gas to a patient comprising:

A) providing a system that is adapted to administer therapeutic gas to a patient, the system including

(1) a front end which has a supply source, a first solenoid purge valve and reservoir solenoid valve, first and second equalization valves, a first fluid conduit, a fluid manifold, a front end pressure sensor, and

(2) a reservoir portion which has a reservoir unit, a fluid manifold, and a reservoir pressure sensor; and

B) purging the front end.

3. The method defined in Claim 1 wherein the step of purging the front end includes

- (1) closing the first solenoid purge valve and the reservoir solenoid valve,
- (2) charging the front end with fresh gas from a supply source,
- (3) waiting for pressure as read by the front end pressure sensor to rise past a minimum threshold,
- (4) venting gas out of the system through the first solenoid purge valve,
- (5) opening the reservoir solenoid valve and allowing the reservoir unit and the manifold of the reservoir portion to fill to working pressure levels,
- (6) stopping the charging from the supply source,
- (7) closing the reservoir solenoid valve,
- (8) opening the first solenoid purge valve and allowing gas in the front end to vent until pressure as measured by the front end pressure sensor is higher than, but approaching, atmospheric pressure,
- (9) closing the first solenoid purge valve, and
- (10) opening the reservoir solenoid valve and allowing the

pressure in the front end and in the reservoir unit to equalize with each other.

4. The method defined in Claim 3 wherein the step of purging the front end further includes a step of repeating the steps of closing the reservoir solenoid valve, and opening the first solenoid purge valve and allowing gas in the front end to vent until pressure as measured by the front end pressure sensor is higher than, but approaching, atmospheric pressure, closing the first solenoid purge valve and opening the reservoir solenoid valve and allowing the pressure in the front end and in the reservoir unit to equalize with each other until there is insufficient gas to continue as measured by the reservoir pressure sensor.

5. The method defined in Claim 4 further including a step of repeatedly purging the front end.

6. The method defined in Claim 1 wherein the step of purging the reservoir portion includes

- (1) completing the step of purging the front end,
- (2) charging the front end and the reservoir with fresh gas from a supply source,
- (3) waiting for pressure as read by the front end pressure

sensor to rise past a minimum threshold,

(4) closing the reservoir solenoid valve and dispensing gas out of the reservoir unit and out through a path downstream of the reservoir unit,

(5) monitoring the pressure in the reservoir unit and continuing to dispense gas until the pressure in the reservoir unit drops to above but near atmospheric pressure, and

(6) refilling the reservoir unit and the path downstream of the reservoir unit until the reservoir unit and the path downstream of the reservoir unit reaches an operating pressure.

7. The method defined in Claim 6 further including repeating the steps of closing the reservoir solenoid valve and dispensing gas out of the reservoir unit and out through a path downstream of the reservoir unit, and monitoring the pressure in the reservoir unit and continuing to dispense gas until the pressure in the reservoir unit drops to above but near atmospheric pressure, and refilling the reservoir unit and the path downstream of the reservoir unit until the reservoir unit and the path downstream of the reservoir unit reaches an operating pressure.

8. The method defined in Claim 2 wherein the step of purging the front end includes

- (1) opening the supply valve of the supply source,
- (2) venting gas out of the system through the first solenoid purge valve,
- (3) opening the reservoir solenoid valve,
- (4) closing the first solenoid purge valve a short time after the reservoir solenoid valve has been opened,
- (5) allowing the pressure in the reservoir unit to build up to a working pressure,
- (6) closing the reservoir solenoid valve,
- (7) closing the supply valve of the supply source,
- (8) opening the first solenoid purge valve and allowing gas in the front end to vent until pressure as measured by the front end pressure sensor is higher than but approaching atmospheric pressure and then closing the first solenoid purge valve,
- (9) opening the supply valve on the supply source, and
- (10) opening the reservoir solenoid valve.

9. The method defined in Claim 8 including repeating the steps of opening the supply valve of the supply source, venting gas out of the system through the first solenoid purge valve, opening the reservoir solenoid valve, closing the first solenoid purge valve a short time after the reservoir solenoid valve has been opened, allowing the pressure in the reservoir unit to build up to a

working pressure, closing the reservoir solenoid valve, closing the supply valve of the supply source, opening the first solenoid purge valve and allowing gas in the front end to vent until pressure as measured by the front end pressure sensor is higher than but approaching atmospheric pressure before the steps of opening the supply valve on the supply source, and opening the reservoir solenoid valve.

10. A method for purging a system that is used in administrating therapeutic gas to a patient comprising:

A) providing a system that is adapted to administer therapeutic gas to a patient, the system including a front end which has first and second automated solenoid valves, first and second equalization valves, a first fluid conduit, first and second fluid manifolds, a front end pressure sensor, and a high pressure regulator; and

B) purging the front end.

11. A method for purging a system that is used in administrating therapeutic gas to a patient comprising:

A) providing a system that is adapted to administer therapeutic gas to a patient, the system including a reservoir portion which has a reservoir unit, a plurality of fluid manifolds, and a

reservoir pressure sensor;

B) purging the reservoir portion.

12. A method for purging a system that is used in administrating therapeutic gas to a patient comprising:

A) providing a system that is adapted to administer therapeutic gas to a patient, the system including

(1) a front end which has first and second automated solenoid valves, first and second equalization valves, a first fluid conduit, first and second fluid manifolds, a front end pressure sensor, and a high pressure regulator, and

(2) a reservoir portion which has a reservoir unit, a fluid manifold, and a reservoir pressure sensor;

B) purging the front end;

C) purging the reservoir portion; and

D) rinsing by:

(1) closing the second solenoid valve,

(2) dispensing gas out of the reservoir unit and out through a gas path located downstream of the reservoir unit,

(3) monitoring pressure in the reservoir unit,

(4) continuing to dispense gas from the reservoir unit until pressure in the reservoir unit drops to above but near atmospheric pressure,

(5) refilling the reservoir unit and the reservoir portion downstream of the reservoir unit through the fluid manifold of the reservoir portion, and

(6) continuing the refilling step until the reservoir unit reaches a working pressure level.

13. The method defined in Claim 12 wherein the rinsing steps are repeated a plurality of times.

14. A process for administrating therapeutic gas to a patient comprising:

- A) providing a source of therapeutic gas at a supply pressure;
- B) connecting the source of therapeutic gas to an inlet of a first fluid conduit;
- C) connecting an outlet of the first fluid conduit to a first fluid manifold that is part of a first set of fluidic plumbing elements;
- D) permitting gas to flow between the source of therapeutic gas and a first fluid manifold when pressure of the source of therapeutic gas is greater than the pressure of the first fluid manifold plus a first equalization pressure or when the pressure of the first fluid manifold is greater than the pressure of the source of therapeutic gas plus a second equalization pressure and preventing flow from the source of therapeutic gas to the first

fluid manifold and preventing flow from the first fluid manifold to the source of therapeutic gas at all other pressures; and E) purging the first set of fluidic plumbing elements.

15. A method for purging a system that is used in administrating therapeutic gas to a patient comprising:

A) providing a system that is adapted to administer therapeutic gas to a patient, the system including

(1) a front end which has a first solenoid purge valve and reservoir solenoid valve, first and second equalization valves, a first fluid conduit, a fluid manifold, a front end pressure sensor,

(2) a reservoir portion which has a reservoir unit, a fluid manifold, and a reservoir pressure sensor, and

(3) a supply source; and

B) purging the front end.

16. The method defined in Claim 8 wherein the step of venting gas out of the system through the first solenoid purge valve includes venting between 500 ml and 1000 ml at STP of gas before opening the reservoir solenoid valve.